

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
27 December 2001 (27.12.2001)

PCT

(10) International Publication Number
WO 01/98868 A2

- (51) International Patent Classification⁷: **G06F**
- (21) International Application Number: PCT/US01/19944
- (22) International Filing Date: 22 June 2001 (22.06.2001)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/213,336 22 June 2000 (22.06.2000) US
- (71) Applicant and
(72) Inventor: MAYER, David, F. [US/US]; 487 Van Heyde Place, Columbus, OH 43209-2271 (US).
- (74) Agent: GREENLEE, David, A.; P.O. Box 340557, Columbus, OH 43234 (US).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,

CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, TZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ,UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

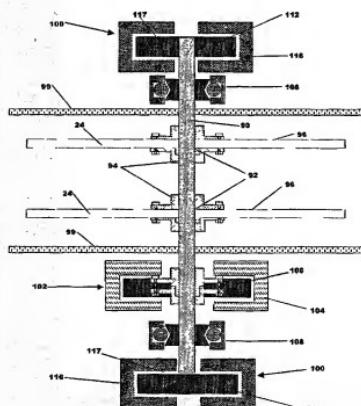
— *of inventorship (Rule 4.17(iv)) for US only*

Published:

— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: MASSIVELY PARALLEL FIXED HEAD DISK DRIVE



(57) Abstract: The invention provides an extremely high throughput magnetic disk drive which uses massively parallel architecture to achieve unprecedented sequential and random access transfer rates. The drive consists of a stationary magnetic head assembly comprising a single integrated circuit made of silicon along with the associated disk and controller. This integrated circuit contains heads, amplifiers, buffers and circuits for verification of all disk operations. The head assembly operates on disks made of crystalline silicon to avoid problems of differential thermal contraction and to insure rigidity. It communicates with the host computer's random access memory by means of a novel and unique disk controller, which has the high capacity throughput to take advantage of the high throughput speed of this disk drive. The most important feature of this disk drive is that all disk tracks are processed (read or written) concurrently each time a given sector is available to the heads, which means that the entire disk can be read or written on each revolution. Massively parallel architecture throughout the head and controller design permits the achievement of typical sequential input/output transfer rates of more than 60 Gigabytes per second, having average sequential access times of 0.011 microseconds (roughly 2000 times as fast as current technology) and average random access times on the order of 10 microseconds (roughly 5000 times as fast as current technology). This will provide large multi-user computer systems with an overall increase of throughput of a factor of at least 2000.